Climate Change Planning in Alaska's National Parks

INTERIOR ARCTIC PARKS
Scenario Drivers and Climate Effects

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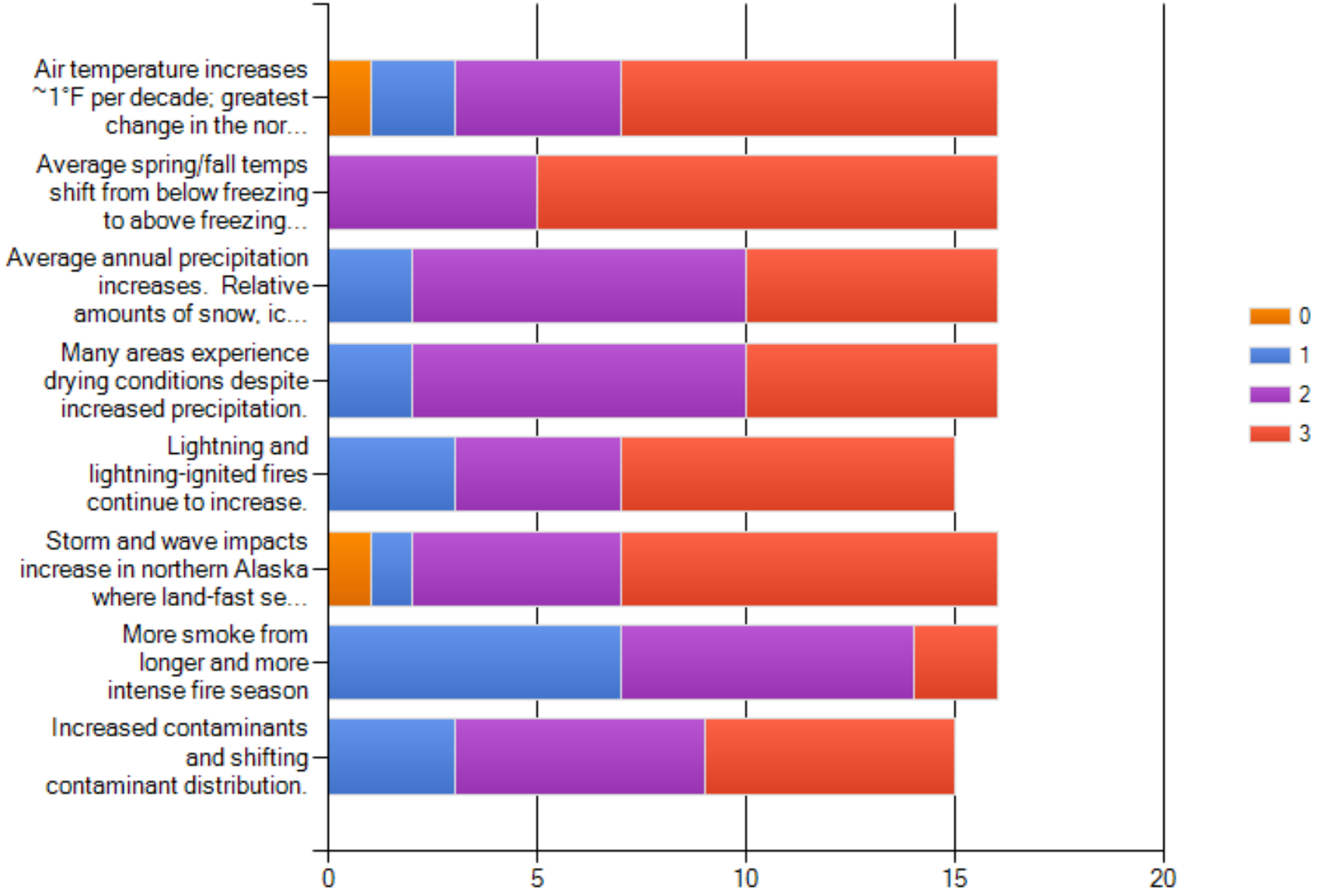
Climate Drivers

- Climate drivers are the **critical forces** in our scenarios planning process
- Critical forces generally have unusually **high impact** and unusually **high uncertainty**
- Climate drivers table specific for SE Alaska were compiled by John Walsh and Nancy Fresco of SNAP (see handouts).
- All scenarios are created by examining the intersection of two drivers, creating four sectors
- **Selection of drivers** is crucial to the planning process
- The importance of drivers is directly related to their potential **effects**

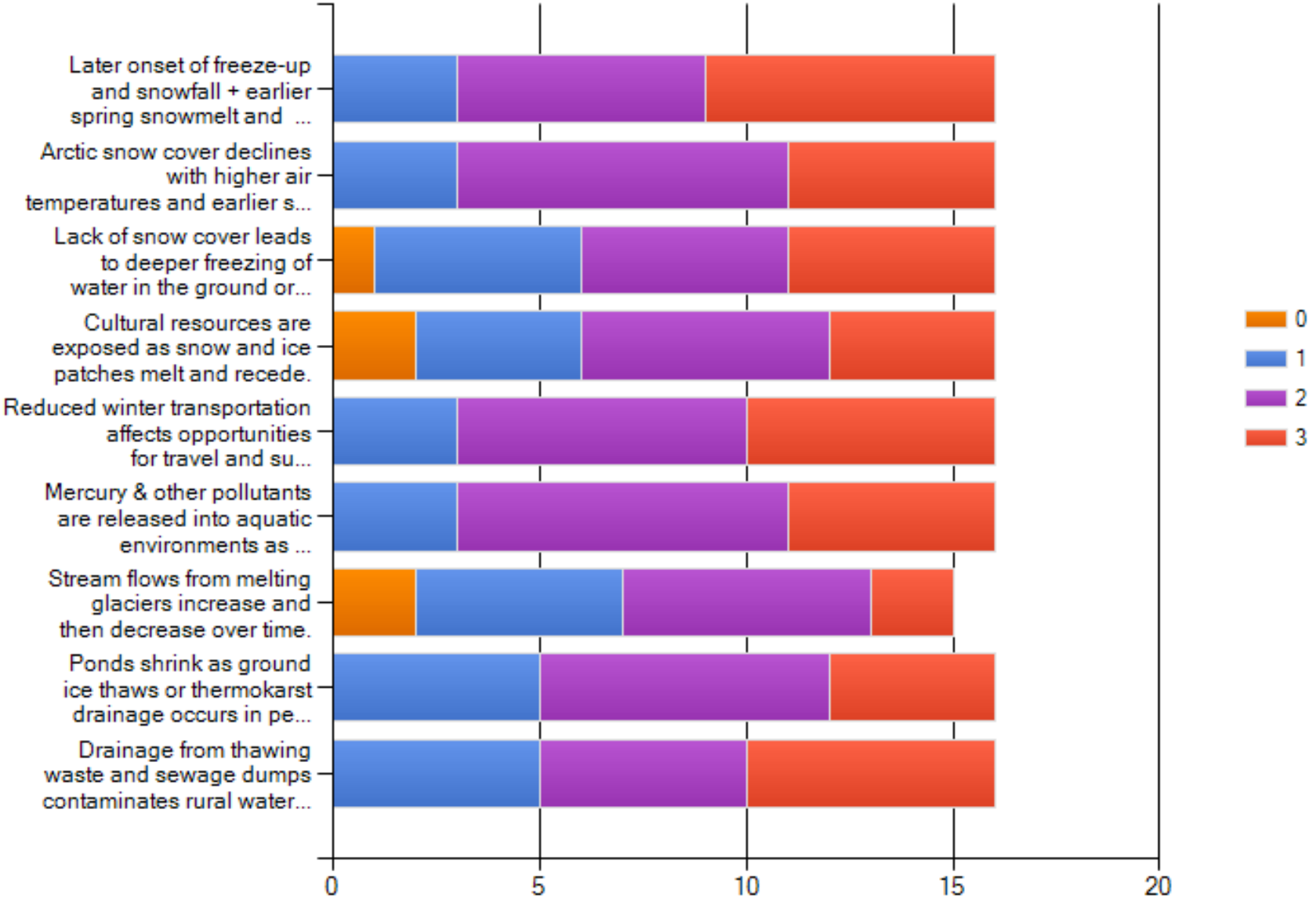
Arctic Park Units

Climate Variable	Projected Change by 2050	Projected Change by 2100	Patterns of Change	Confidence	Source
Temperature	+2.5°C ±1.5°C	+5°C ±2°C	More pronounced in N and autumn-winter	>95% for increase	IPCC (2007); SNAP/UAF
Precipitation (rain and snow)	Winter snowfall Autumn rain and snow	Winter snowfall Autumn rain and snow	Increased % falls as rain in shoulder seasons	High uncertainty in timing of snow onset and melt	AMAP/SWIPA; SNAP/UAF
Freeze-up Date	5-10 days later	10-20 days later	Largest change near coast	>90%	SNAP/UAF
Length of Ice-free Season (rivers, lakes)	↑ 7-10 days	↑ 14-21 days	Largest change near coast	>90%	IPCC (2007); SNAP/UAF
Length of Growing Season	↑ 10–20 days	↑ 20–40 days	Largest change near coast	>90%	IPCC (2007); SNAP/UAF
River and Stream Temps	↑ 1–3°C	↑ 2–4°C	Earlier breakup, higher summer temps	>90%	Kyle & Brabets (2001)
Water Availability	↓ 0–20%	↓ 10–40%	Longer summer, thicker active layer	>66% varies by region	SNAP/UAF; Wilderness Society
Relative Humidity	0% ±10% ↑ or ↓	0% ±15% ↑ or ↓	Absolute humidity increases	50% *as likely as not*	SNAP/UAF
Wind Speed	↑ 2–4%	↑ 4–8%	More pronounced in winter & spring	>90% for increase	Abatzoglou & Brown
PDO	Uncertain	Uncertain	Major effect on Alaska temps in cold season	High degree of natural variation	Hartmann & Wendler (2005)
Extreme Events: Temperature	3-6x more warm events; 3-5x fewer cold events	5-8x more warm events; 8-12x fewer cold events	↑ warm events, ↓ cold events	>95% likely	Abatzoglou & Brown; Timlin & Walsh (2007)
Extreme Events: Precipitation	Change of –20% to +50%	Change of –20% to +50%	↑ winter ↓ spring	*Uncertain*	Abatzoglou & Brown
Extreme Events: Storms	↑ frequency/intensity	↑ frequency/intensity	Increase	>66%	Loehman (2011)

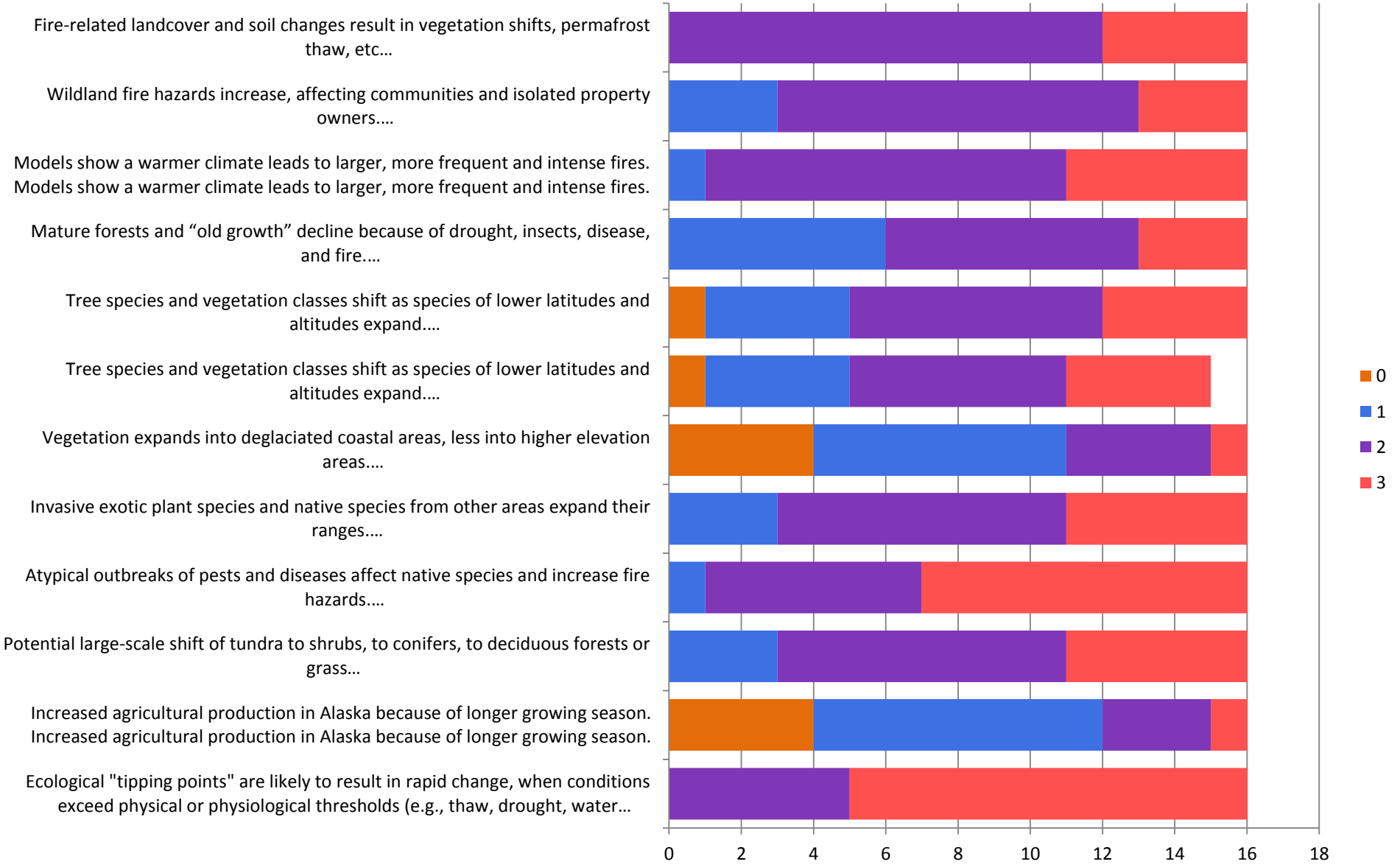
On a scale of zero to three, where 0=not important, 1=of minor importance, 2=fairly important and 3=very important, how would you rank the following possible ATMOSPHERIC climate change effects?



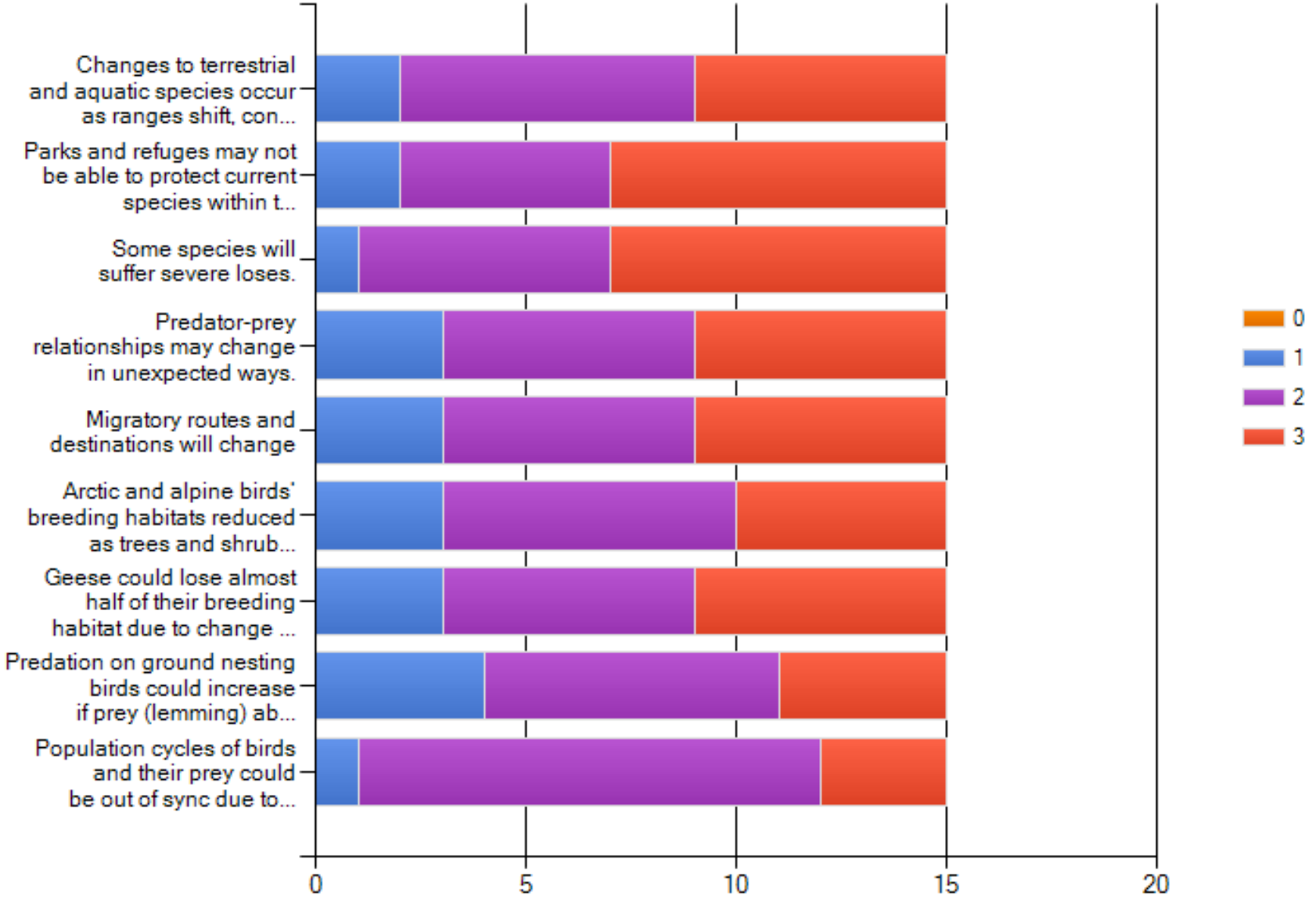
On a scale of zero to three, where 0=not important, 1=of minor importance, 2=fairly important and 3=very important, how would you rank the following possible CRYOSPHERIC and HYDROSPHERIC climate change effects?



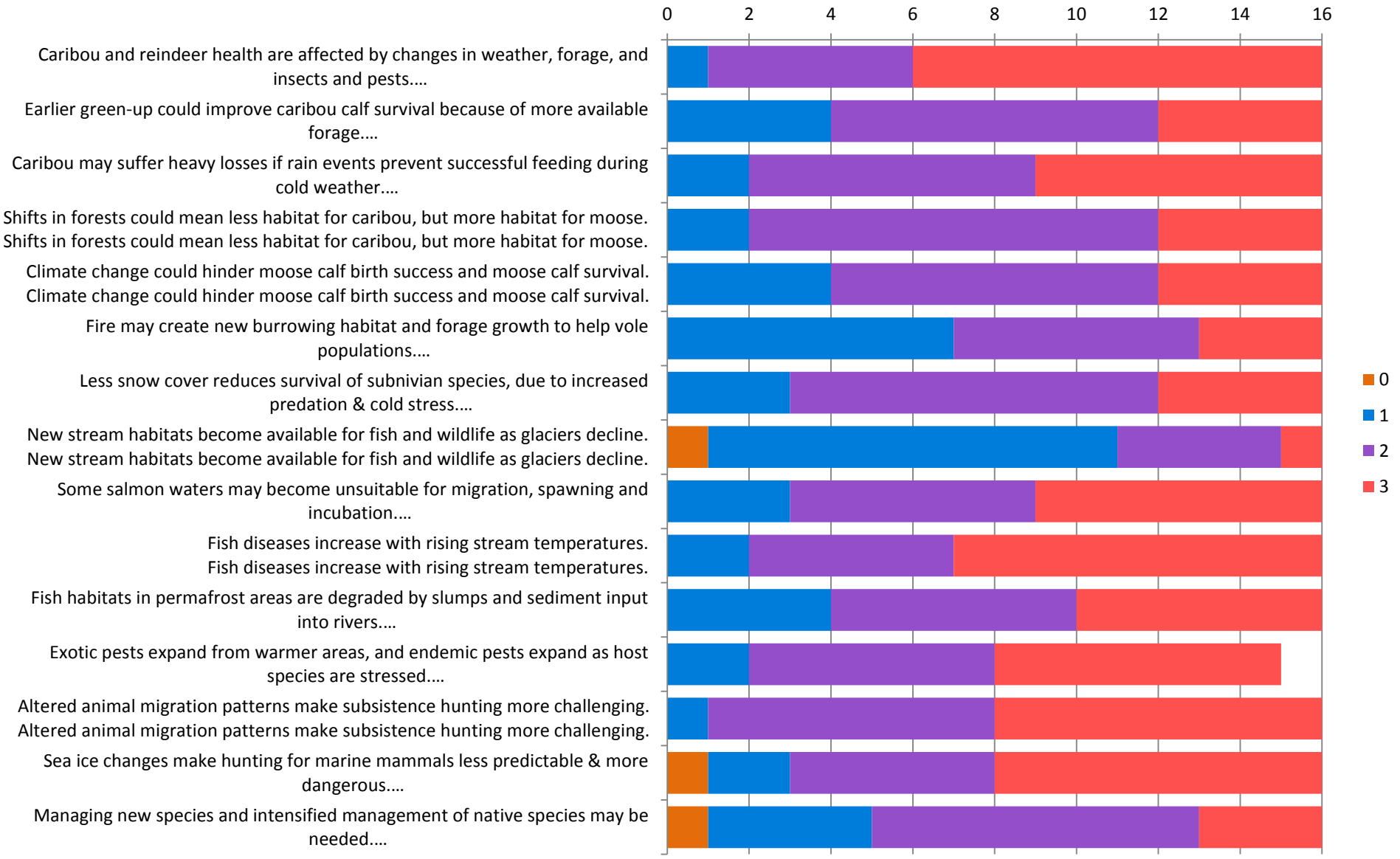
On a scale of zero to three, where 0=not important, 1=of minor importance, 2=fairly important and 3=very important, how would you rank the following possible BIOSPHERIC climate change effects? (Part I -- vegetation and fire)



On a scale of zero to three, where 0=not important, 1=of minor importance, 2=fairly important and 3=very important, how would you rank the following possible BIOSPHERIC climate change effects? (Part II -- wildlife, birds)



On a scale of zero to three, where 0=not important, 1=of minor importance, 2=fairly important and 3=very important, how would you rank the following possible BIOSPHERIC climate change effects? (Part III -- mammals, fisheries, subsistence)



On a scale of zero to three, where 0=not important, 1=of minor importance, 2=fairly important and 3=very important, how would you rank the following other possible climate change effects?